IN THE SPECIFICATION

Please amend the Title on page 1 as follows:

~~APPARATUS AND~~ SYSTEM FOR MOUNTING COMPONENTS ON BOARDS ~~AND PROGRAM FOR CONTROLLING THE SAME~~.

Please replace the paragraph beginning at page 8, line 28, with the following rewritten paragraph:

The first and second board transfer devices 10a, 10b take substantially the same construction with each other, and therefore, the first board transfer devices 10a will be mainly described for the both transfer devices 10a, 10b. In the first board transfer devices 10a, as shown in Figures 2 and 3, a pair of outside support pedestals 12, 12 are upright fixed on a base 11, and a pair of inside support pedestals 12a, 12a which face the outside support pedestals 12, 12 are upright fixed respectively on sliders 15a, 15a. In order to make the distance between the outside support pedestals 12, 12 and the inside support pedestals 12a, 12a variable, the sliders 15a, 15a are slidably carried on the base 11 along guide rails 15, 15 which extend in perpendicular to the outside support pedestals 12, 12. A pair of support plates 13, 13 are ~~secure~~ secured respectively to upper inner surfaces of the outside support pedestals 12, 12 and upper inner surfaces of the inside support pedestals 12a, 12a. A pair of side rails 14, 14 are fixed on the top surfaces of the support plates 13, 13. Upper edges of the side rails 14, 14 at the outside and inside are formed respectively with flange portions 14a, 14a which protrude inwardly toward each other. These flange portions 14a, 14a are

respectively over support rails 20, 20 which are secured respectively to the inner surfaces of the support plates 13, 13.

Please replace the paragraph beginning at page 10, line 27, with the following rewritten paragraph:

Boards Sa, Sb are loaded into and unloaded from the component mounting apparatus with both side edges thereof being supported by the respective pairs of the conveyor belts 21, 21, 21, 21 of the first and second board transfer devices 10a, 10b. After being transferred to respective predetermined positions, the boards Sa, Sb are lifted up with the elevation of [[the]] backup devices 24 and are positioned to respective component mounting positions as a result of being brought into abutting engagement with the flange portion 14a of each side rail 14.

Please replace the paragraph beginning at page 13, line 6, with the following rewritten paragraph:

In this particular embodiment, the pairs of inside support pedestals 12a, 12a of the first and second transfer devices 10a, 10b are movable independently of each other pair with the pairs of outside support pedestals 12, 12 being fixed on the base 11. However, the structure of the transfer devices 10a, 10b is not restricted to this type. In one modified form, the pairs of inside support pedestals 12a, 12a may be fixed on the base 11, and instead, the pairs of the outside support pedestals 12, 12 may be movable with the two screw shafts 31, 35 independently of each other pair. Or, in another modified form, the outside support pedestals

12 of one of the board transfer devices 10a (10b) and the inside support pedestals 12a of the other board transfer device 10b (10a) may be fixed on the base 11, and the remaining outside support pedestals and the remaining inside support pedestals may be independently movable with the two screw shafts 31, 35. In still another modified form, only the outside support pedestals 12 of one of the board transfer devices 10a (10b) may be fixed on the base 11, the two pairs of inside support pedestals 12a, 12a may be bodily movable with a screw shaft, and the outside support ~~pedestal s~~ pedestals 12 of the other board transfer device 10b (10a) may be movable with another screw shaft independently of the two pairs of inside support pedestal 12a, 12a.

Please replace the paragraph beginning at page 13, line 23, with the following rewritten paragraph:

As shown in Figure 1, the component placing device 40 is composed of a pair of fixed rails 41, 41 which are supported on the base 11, ~~being~~ to be arranged over the opposite ends of the both board transfer devices 10a, 10b in parallel relation with each other, two head guide rails 42a, 42b which are arranged perpendicularly to the fixed rails 41, 41 with both ends thereof being supported movably along the fixed rails 41, 41 and two component placing heads 43a, 43b supported movably respectively along the head guide rails 42a, 42b. The fixed rails 41, 41 and the head guide rails 42a, 42b constitute head moving mechanisms each for feeding an associated one of the component placing heads 43a, 43b at least in two directions parallel to a component mounting surface (i.e., upper surface in this particular embodiment) of each board Sa, Sb. Each of the component placing heads 43a, 43b is

provided with a vertically movable suction nozzle unit (not shown) for sucking or holding a component thereto. The head guide rails 42a, 42b, the two component placing heads 43a, 43b and the suction nozzle ~~unit~~ units are controlled respectively by servomotors (not shown), so that [[the]] each suction nozzle unit successively holds plural components supplied from component supply devices 45a, 45b and successively mounts the components on the boards Sa, Sb held at the component mounting positions on the board transfer devices 10a, 10b, as described later in more detail.

Please replace the paragraph beginning at page 20, line 20, with the following rewritten paragraph:

In the second embodiment shown in Figure 9, the two board transfer devices 10a, 10b are controlled to make different from each other the stop positions in the transfer direction to which the boards Sa, Sb are respectively stopped for component mounting operations thereon. The predetermined interference risk zones ~~S1, S1~~ Si, Si adjacent to the central portion between the boards Sa, Sb during the component mounting operations no longer exist where the respective stop positions are separated a suitable distance or more. This advantageously can preclude the chance that the two component placing heads 43a, 43b interfere with each other in mounting components respectively on the boards Sa, Sb. Therefore, the efficiency in mounting components on the boards Sa, Sb can be enhanced, and at the same time, the program for controlling the operation of the component mounting apparatus can be simplified.

Please replace the paragraph beginning at page 21, line 15, with the following rewritten paragraph:

At the beginning, when neither of the first and second component mounting heads 43a, 43b is mounting any component within the interference risk zone [[S1]] Si on the board Sa (or Sb) corresponding thereto, the controller 60 advances its control operation from Step 110 to Step 112 via Step 111 of the flow chart shown in Figure 25. At Step 112, each of the component mounting heads 43a, 43b mounts a component within the interference-free zone on the board Sa, Sb held on the board transfer device 10a, 10b corresponding thereto. On the contrary, when the first component placing head 43a performs the component mounting within the interference risk zone [[S1]] Si on the board Sa held on the board transfer device 10a corresponding thereto, the control operation of the controller 60 is advanced from Step 110 to Step 113, whereby the second component placing head 43b mounts a component within the interference-free zone on the board Sb held on the second board transfer device 10b. Further, when the second component placing head 43b performs the component mounting within the interference risk zone [[S1]] Si on the board Sb held on the second board transfer device 10b, the control operation of the controller 60 is advanced from Step 111 to Step 114, whereby the first component placing head 43a mounts a component within the interference-free zone on the board Sa held on the first board transfer device 10a. Therefore, it does not occur that the component placing heads 43a, 43b simultaneously mount components within the interference risk zones ~~S1, S1~~ Si, Si of the boards Sa, Sb, and there can be avoided such a danger or chance that the two component placing heads 43a, 43b interfere with each other in performing the component mountings on the boards Sa, Sb.

Please replace the paragraph beginning at page 22, line 24, with the following rewritten paragraph:

On the other hand, when the second board transfer device 10b is transferring the boards Sb as shown in Figure 12, or is altering the width of its transfer way, the controller 60 advances the control operation step from Step 120 to Step 122 or 123 via Step 121 and further to Step 126. At this Step 126, the first component placing head 43a successively picks up designated components from the first component supply device 45a and mounts them one after another at the designated positions within the interference risk zone Si on the board Sa held at the component mounting position on the first board transfer device 10a. Since no component mounting is performed on the board Sb while the second board transfer device 10b is transferring the boards Sb or is altering the width of its transfer way, the second component placing head 43b may be made to flee to the position where it has no ~~change~~ chance to interfere with the first component placing head 43a, as shown in Figure 12. When so fleeing, the second component placing head 43b hardly interferes with the first component placing head 43a which is operating to mount components within the interference risk zone Si on the board Sa. Or, the second component placing head 43b may be directed to help the first component placing head 43a in mounting components within the interference risk zone Si on the board Sa. Where the second component placing head 43b is so directed, the productivity of the boards Sa can be enhanced. In this latter case, the two component placing heads 43a and 43b have to be controlled to obviate the interference therebetween.

Please replace the paragraph beginning at page 23, line 16, with the following rewritten paragraph:

Similarly, when the first board transfer device 10a is transferring the boards Sa or is altering the width of its transfer way, the controller 60 advances the control operation step from Step 120 or 121 to Step 125, and the second component placing head 43b successively mounts components at designated positions within the interference risk zone S1 on the board Sb held on the second board transfer device 10b. Also in this case, the first component placing head 43a which does not perform mounting the components on the board Sa is made to take shelter or flee, so that it does not occur that the first component placing head 43a interferes with the second component placing head 43b which is mounting the components within the interference risk zone [[S1]] Si on the board Sb. Or, where the first component placing head 43a is directed to help the second component placing head 43b in mounting the components within the interference risk zone [[S1]] Si on the board Sb, the productivity of the board Sb can be enhanced.

Please replace the paragraph beginning at page 25, line 19, with the following rewritten paragraph:

In the production, as shown in Figure 14, the first board transfer device 10a successively loads the type-A boards, and the first component placing head 43a (not shown) successively mounts designated components on each of the loaded type-A boards. In parallel time relation with this, the second board transfer device 10b successively loads the type-B boards, and the second component placing head 43b (not shown) successively mounts

designated components on each of the loaded type-B boards. In this production example, in order to obviate the physical interference between the both component placing heads 43a and 43b in mounting components within the interference risk zones Si, Si on the type-A and type-B boards, the stop positions in the transfer directions on the transfer devices 10a, 10b may be set to be different from each other, as exemplified in Figure 9.

Please replace the paragraph beginning at page 26, line 12, with the following rewritten paragraph:

Upon termination of altering the transfer way width of the second board transfer device 10b, as shown in Figure 16, the mountings by the second component placing head 43b of the components are performed on the type-C boards successively loaded by the second component transfer device 10b, in parallel time relation with the mountings by the first component placing head 43a of the components on the type-A boards. Where the feeders for the components to be mounted on the type-C boards have been set on the feeder table at the side of the first component supply device 45, the chance for the both component placing heads 43a and 43b to interfere with each other increases, and therefore, measures have to be taken to obviate the interference. In order to take such measures, in the illustrated embodiment in Figure 16, the stop positions of the type-A and type-C boards are made to be different from each other, and the feeders for the type-A boards and those for the type-C boards are arranged with some space (e.g., several vacant or non-use feeders) therebetween. If the measures are imperfect, as shown in Figure 17, a shunting or turnout control is executed, for example, to retract the first component placing head 43a temporally to a turnout

position when the second component placing head 43b is about to move towards the feeders at the side of the first component supply device 45a for picking up the components therefrom. Of course, the control to obviate the interference becomes unnecessary after termination of the type-A board production.

Please replace the paragraph beginning at page 27, line 24, with the following rewritten paragraph:

In the course of the production according to a schedule that a plurality of the type-A products are to be produced, a command to produce the type-B products on an urgent, brake-in basis may be input to the controller 60 from the host computer. In such a case, if the both of the board transfer devices 10a, 10b which [[had]] <u>have</u> been arranged for the regular type products were rearranged for the brake-in products, much loss time would be taken to make the rearrangement. In particular, where the number of the brake-in products to be produced is small, the loss time would become much larger if both of the board transfer devices 10a, 10b were rearranged at the same time.

Please replace the paragraph beginning at page 28, line 5, with the following rewritten paragraph:

In this particular embodiment, in order to reduce the time taken to make the rearrangement, one of the board transfer devices 10a (or 10b) is assigned as regular type product transfer device used exclusively for transferring the boards for the regular type products, while the other transfer device 10b (or 10a) is assigned as brake-in product transfer

device for primarily transferring the boards for the brake-in products which are different in board width from those for the regular type products. As setting means for making this assignment, for example, the memory unit 63 is provided with setting areas which correspond respectively to the board transfer devices 10a, 10b. When a selected one of the board transfer devices is to be assigned as the regular type product transfer device, numeral "1" is set in the setting area associated thereto, or when it is to be assigned as the brake-in product transfer device, numeral "0" is set therein. For example, where the board transfer devices 10a and 10b are to be assigned respectively as the regular type product transfer device and the brake-in product transfer device, numerals "1" and "0" are input from the input unit 64 of the controller 60 to the setting areas of the memory unit 63 respectively associated with the board transfer devices 10a, 10b. And, the feeders retaining the components for the regular type products are exclusively set in the component supply device 45a at the side of the board transfer device 10a, while vacant slots prepared for use in setting the feeders retaining the components for the brake-in products are ~~remained~~ left in the components supply device 45b at the side of the board transfer device 10b.

Please replace the paragraph beginning at page 28, line 26, with the following rewritten paragraph:

When a command for production of the brake-in products (i.e., type-B products) is input from the host computer to the controller 60 (Step 132 in Figure 27) in the course of the ordinary production wherein the boards for the regular type products (i.e., type-A boards) are transferred on both of the board transfer devices 10a, 10b and wherein the regular type

products (i.e., type-A products) are under the ordinary production at the both of the board transfer devices 10a, 10b (Step 131), the board transfer device 10b prepared for the brake-in products stops loading a successive type-A board and performs the processing to discharge the type-A board now thereon. (Step 133) The mounting program for mounting the components on the board transferred by the board transfer device 10b to the component mounting position is changed from a type-A product mounting program to a type-B product mounting program. (Step 134) Then, the transfer way width of the board transfer device 10b in a direction perpendicular to the transfer direction is altered to meet a rail-to-rail width corresponding to the type-B boards. (Step 135) Thereafter, it is judged whether or not, the component mountings on the type-A boards at the board transfer device 10a and the component mountings on the type-B boards at the board transfer device 10b ~~causes~~ cause the interference between the component placing heads 43a, 43b so that such simultaneous mountings are impossible. (Step 136) If possible, the component mountings on the type-A boards at the board transfer device 10a and the component mountings on the type-B boards at the board transfer device 10b are carried out simultaneously. (Step 137) Where the simultaneous productions are impossible, on the contrary, the component mountings at the board transfer device 10a are halted, during which time the component mountings on the type-B boards are carried out at the board transfer device 10b until the number of the type-B boards reaches a commanded number. (Step 138) When the component mountings on the type-B boards of the commanded number are completed (Step 139), the board transfer device 10a is restored to the production for the type-A products, and the type-A products are produced as ordinary on both of the board transfer devices 10a, 10b.

Please replace the paragraph beginning at page 29, line 28, with the following rewritten paragraph:

Next, the seventh embodiment will be described with reference to Figures 19 and 20. In this embodiment, where the boards on which the component mountings are to be carried out at the board transfer devices 10a, 10b are changed from the first type product boards (e.g. type-A boards) to the second type product boards (e.g. type-B boards), component mountings on a trial basis are carried out at the board transfer devices 10a, 10b, and unless any problem is given rise to, the mounting operations of the purpose are started. Where the component mountings on the type-B boards are started immediately after the component mountings on the type-A boards are completed at the board transfer devices 10a, 10b, it is often the case that the type-B boards with the components so mounted thereon have defects in quality. This gives rise to faulty products and a time loss in production. Therefore, it has been a practice [[in]] <u>on</u> production sites that prior to such change in production, prior trial mountings of components are performed on the type-B boards at the board transfer device which is to be used after the change in production. However, taking into account the fact that the condition of the component mounting apparatus changes as time expires long after the trial mountings and that reconfirmation has to be made as to whether the feeders necessary for mounting components on the type-B boards have been set on the component mounting apparatus, it is preferable to perform the trial basis mountings right before the full-scale basis production of the type-B products. In this viewpoint, in this particular embodiment, by taking the advantage that the component mounting apparatus is provided with the two board transfer devices 10a, 10b, component mountings on a trial basis are started on the type-B boards at

one of the board transfer devices 10b (or 10a), during which time component mountings on a full-scale basis are continued on the type-A boards at the other transfer device in parallel time relation.

Please replace the paragraph beginning at page 30, line 25, with the following rewritten paragraph:

As shown in Figure 19 for example, it is now assumed that the board transfer device 10a has been set as the regular type product transfer device, while the board transfer device 10b has been set as the brake-in product transfer device and that one-side production is being performed wherein the full-scale basis production of the first regular type products is carried out on the first regular type boards (type-A boards) at the board transfer device 10a, while no component mounting operation is being carried out at the board transfer device 10b. It is further assumed that another one-side production is further commanded for performing component mountings on the boards (type-B boards) for the second regular type products while the preceding one-side production is being carried out for component mountings on the first regular type boards (type-A boards) at the board transfer device 10a. In this case, there is set a mounting program for performing component mounting operations on the type-B boards at the board transfer device 10b, and the rail-to-rail width of the board transfer device 10b is adjusted or altered to correspond to the type-B boards. Thus, the full-scale basis mountings of components are performed on the type-A boards at the board transfer device 10a, and the trial basis mountings of components are performed on the type-B boards at the board transfer device 10b. Where the change from the first regular type products to the

second regular type products has been determined in dependence upon the production schedule, the timing when the trial basis component mountings are to be started is determined taking into account the progress in production of the first regular type products, the time period for the trial basis production of one or several second regular products and the time period necessary for inspection and reworking on the one or several products produced on the trial basis. Where the change to the second regular type products is suddenly instructed, the trial basis component mountings on the boards for the second regular type products are started at the time point at which the change command is given. The type-B boards (one or several) with components mounted thereon are unloaded from the board transfer device 10b and are inspected. The inspection is carried out with respect to such items as mounting position, wrong components, setting error of feeders, mounting position accuracy and so on. If any problem arises as a result of the inspection, modifications concerning such faulty items are made for the adjustment in component mountings on the type-B boards at the board transfer device 10b, the change in the set feeders and the like. After the problems are all solved, the component mountings on the type-B boards are started on the full-scale basis at the board transfer device 10b, and the component mountings on the type-A boards at the board transfer device 10a are terminated when the type-A products of a scheduled number are attained. Thereafter, in order that the setting change is performed to set the board transfer device 10b as the regular type product transfer device and the board transfer device 10a as the brake-in product transfer device, numerals [[“0”]] “1” and [[“1”]] “0” are input from the input device 64 respectively to the setting areas for the board transfer devices 10a, 10b of the memory unit 63 of the controller 60.

Please replace the paragraph beginning at page 33, line 18, with the following rewritten paragraph:

As shown in Figures 2 and 21, the two board transfer devices 10a, 10b are juxtaposed for transferring the boards in the respective transfer directions parallel to each other, and the two components supply devices 45a, 45b are arranged respectively at the outsides opposite to the center side or portion where the board transfer devices 10a, 10b adjoin to each other. The board transfer devices 10a, 10b are provided with respective pairs of the guide rails 25a, 26a and 25b, 26b each pair for guiding the both sides of boards transferred therealong. The support rails 20, 20 and the side rails 14, 14 which constitute the outside guide rails 25a, 25b respectively adjacent to the component supply devices 45a, 45b are secured to the outside support pedestals 12, 12 upright fixed on the base 11. On the other hand, the support rails 20, 20 and the side rails 14, 14 which constitute the center side guide rails 26a, 26b are secured to the inside support pedestals 12a, 12a which are supported and guided on the base 11 each for position adjustment in the direction perpendicular to the direction in which the guide rails extend. The inside support pedestals 12a, 12a are movable respectively by the first and second drive motors 33, 37 through the first and second screw shafts 31, 35 in accordance with the commands from the controller 60, so that the center side guide rails 26a, 26b are adjusted in position in the direction perpendicular to the lengthwise directions thereof to alter the transfer way width or the rail-to-rail width of each board transfer device 10a or 10b in correspondence to the boards transferred therealong. The guide rail position adjusting means [[27]] (i.e., the conveyor width adjusting devices 30) for adjusting the positions of the center side guide rails 26a, 26b is composed of the inside

support pedestals 12a, 12a, the first and second drive motors 33, 37, the first and second screw shafts 31, 35, the controller 60 and the like. Thus, where the distance or space between the two guide rails 25a, 26a or 25b, 26b is adjusted to be narrow, an extra space is made between the movable guide rails 26a and 26b which are at the center side of the board transfer devices 10a, 10b. This extra space advantageously results in setting the two boards on the transfer devices 10a, 10b apart from each other, so that the chance for the two component placing heads 43a, 43b to interfere with each other can be minimized.

Please replace the paragraph beginning at page 34, line 20, with the following rewritten paragraph:

In a modified form of the invention, in the same manner as the inside support pedestals 12a, 12a are done, the outside support pedestals 12, 12 may be slidably guided on the base 11 and may be movable by drive servomotors through screw shafts thereby to make the outside guide rails 25a, 25a adjustable by the position adjusting means [[27]] in the direction perpendicular to the lengthwise direction of the outside guide rails 25a, 25a. In this modified form, it ~~become~~ becomes realized to make a larger extra space at the center side of the board transfer devices 10a, 10b, so that the chance for the two component placing heads 43a, 43b to interfere with each other can be minimized more reliably. This can be done by positioning the outside guide rails 25a, 25b at the outmost positions respectively closest to the component supply devices 45a, 45b and by adjusting the center side guide rails 26a, 26b to set the rail-to-rail width of each board transfer device 10a or 10b in correspondence to the width of the boards transferred therealong. Further, in this modified form of the embodiment,

it becomes realized to shorten the moving distances of the component placing heads 43a, 43b and to obviate the interference therebetween. To this end, a prior judgment is made of whether or not, any feeder for the components to be mounted on the boards transferred by the board transfer devices 10a, 10b has been set in the component supply device 45b or 45a located at the remote side. And, where it can be confirmed that any such feeder has been set only in the component supply device 45b or 45a located at the closer side, the outside guide rails 25a, 25b are controlled to be positioned closest to the component supply device 45b or 45a, as mentioned earlier.

Please replace the paragraph beginning at page 37, line 8, with the following rewritten paragraph:

In accordance with a command from the controller 60, the second shifting device 53 selects those boards which are still to have components mounted thereon continuously, from the boards Sa, Sb loaded from the mounting stations 50, 51 onto the exit side board transfer devices 53a, 53b and shifts such those boards onto a first exit side board transfer device 53a to transfer them to a succeeding mounting station (not shown). Likewise, the second shifting device 53 shifts those boards with which the component mounting operations have been completed, onto the board discharge device 54 to discharge them from the system. That is, the second shifting device 53 includes an exit side shifting mechanism for performing such shifting motion. In [[the]] Figure 22, the exit side shifting mechanism is represented by an arrow of the shape "N" and for the sake of brevity, is omitted from being described in detail.

Please replace the paragraph beginning at page 37, line 19, with the following rewritten paragraph:

The production line in this ninth embodiment is designed to be operated in either one of first and second production modes selectable as described hereinafter. In the first production mode, the first shifting device 52 classifies the boards Sa, Sb of plural kinds or types loaded from the preceding production station onto the first entrance side board transfer device 52a, into the boards Sa on which ~~component~~ components are to be mounted at the first board transfer devices 10a, 10a of the mounting stations 50, 51 and into those Sb on which ~~component~~ components are to be mounted at the second board transfer devices 10b, 10b of the mounting stations 50, 51. Then, the first shifting device 52 feeds the former Sa into the first board transfer device 10a of the first mounting station 50 and feeds the latter Sb into the second board transfer device 10b of the first mounting station 50. Thus, the boards Sa, Sb have components mounted thereon by the component mounting apparatus of the mounting stations 50, 51 and then, are sent out to the exit side board transfer devices 53a, 53b of the second shifting device 53. Thereafter, those boards Sa, Sb on which the component mountings are further required are transferred from the first exit side board transfer device 53a onto the succeeding mounting station (not shown), while other boards Sa, Sb on which the component mountings have been completed are discharged from the board discharge device 54.

Please replace the paragraph beginning at page 38, line 9, with the following rewritten paragraph:

In the second production mode, the first shifting device 52 classifies the boards Sa, Sb of plural kinds or types loaded from the preceding production station onto the first entrance side board transfer device 52a, into the boards Sa on which component are to be mounted at the first board transfer devices 10a, 10a of the mounting stations 50, 51 and into those Sb on which any component is not to be mounted at the mounting stations 50, 51. Then, the first shifting device 52 feeds the former Sa onto the first board transfer device 10a of the first mounting station 50 and feeds the latter Sb onto the second board transfer device 10b of the first mounting station 50. Thus, the boards Sa have components mounted thereon at the first board transfer devices 10a, 10a of the mounting stations 50, 51 and then, are sent out to the first exit side board transfer device 53a of the second shifting device 53. On the other hand, the boards Sb are fed by the respective second board transfer devices 10b, 10b to pass through the respective component mounting apparatus of the respective mounting stations 50, 51 without being stopped thereat and are sent out to the second exit side board transfer device 53b of the second shift device 53. And, in the same way as the first production mode, the boards Sa, Sb on which the component mountings are further required are unloaded from the first exit side board transfer device 53a to the succeeding mounting station, while the boards Sa, Sb on which the component mountings have been completed are discharged from the board discharge ~~devices~~ device 54. In this second production mode, the respective second board transfer devices 10b, 10b of the both mounting stations 50, 51 are utilized as bypass conveyor for enabling the boards Sb on which any component is not

mounted at the first board transfer devices 10a, 10a, to bypass the same.

Please replace the paragraph beginning at page 39, line 4, with the following rewritten paragraph:

In the first production mode of the ninth embodiment, even where the boards Sa, Sb of plural kinds or types are loaded in a random order or sequence, they are automatically fed to the corresponding board transfer devices 10a, 10b to have components mounted thereon by the component mounting apparatus, so that flexibility can be increased in the production of the circuit boards. In the second production mode, on the contrary, the boards on which the component mounting is unnecessary at a certain mounting station can bypass such a certain mounting station to be sent forward. Thus, it does not take place that the boards ~~are remained~~ remain stopped in the mid course of the production line, so that the productivity of the boards can be enhanced.

Please replace the paragraph beginning at page 42, line 25, with the following rewritten paragraph:

Although in the aforementioned sixth and tenth embodiments, the component placing heads 43a, 43b of the component placing device 40 are exemplified as being of the XY type that they are movable in two directions parallel to the mounting surface of each boards Sa, Sb, they are not restricted or confined to such XY type. Instead, there may be employed a component placing device with a turret-type component placing head. Of course, each of the component placing head 43a, 43b may be provided with a suction nozzle unit

with plural nozzles for holding a plurality of components thereon at the same time.

Please replace the paragraph beginning at page 44, line 17, with the following rewritten paragraph:

Where the single component placing head 40 is used as described in the modified form shown in Figure 5 for example, the component mounting apparatus can be simplified in construction and made <u>to be</u> suitable for the production of boards which are small in the number of components mounted thereon.

Please replace the paragraph beginning at page 45, line 26, with the following rewritten paragraph:

In the embodiment exemplified in Figure 9 for example, the component mounting positions to which the two boards Sa, Sb are transferred by the two board transfer devices 10a, 10b are ~~made~~ set ~~to be~~ different from each other. Therefore, the chance for the two component mounting heads 43a, 43b to interfere with each other can be minimized, so that the efficiency of the component mountings can be enhanced, and at the same time, the program for controlling the operation of the board mounting apparatus can be simplified.

Please replace the paragraph beginning at page 46, line 5, with the following rewritten paragraph:

In the embodiment exemplified in Figures 8 and 10 for example, while one of the component placing head 43a (or 43b) is mounting components on one of the boards Sa (or

Sb) within the predetermined interference risk zone [[S1]] Si, the other component placing head 43b (or 43a) is controlled to mount components on the other board Sb (or Sa) within an interference-free zone except for the interference risk zone Si. This advantageously minimizes the chance for the two component placing heads 43a, 43b to interfere with each other, so that the efficiency of mounting components on the boards can be enhanced.

Please replace the paragraph beginning at page 48, line 17, with the following rewritten paragraph:

In the embodiment exemplified in Figure 21 for example, of the two guide rails 25a, 26a (or 25b, 26b) which are provided on each of the two board transfer devices 10a, 10b for guiding the both sides of the boards, each outside guide rail 25a (or 25b) adjacent to a corresponding one of the component supply devices 45a, (or 45b) is fixed, while each center side guide rail 26a (or 26b) is adjustably positioned in a direction perpendicular to the lengthwise direction of the rails. Thus, when the space between each two guide rails 25a, 26a (or 25b, 26b) is set to be narrow, the extra space is formed between the two movable rails 26a, 26b at the center side of each board transfer device 45a 45b, and the two boards on the board transfer devices 10a, 10b are sufficiently separated with the extra space, so that the chance for the two component placing heads 43a, 43b to interfere with each other can be minimized.

Please replace the paragraph beginning at page 49, line 28, with the following rewritten paragraph:

In the embodiment exemplified in Figures 8 and 25 for example, the program for controlling the operation of the component mounting apparatus is provided being designed to control the apparatus in such a way that the component placing device 40 mounts the components simultaneously or alternately on two boards Sa, Sb transferred by the two board transfer devices 10b, 10a to respective component mounting positions, and that while either one of the two component placing heads 43a (43b) is mounting the components on either one of the two boards Sa (Sb) within the predetermined interference risk zone [[S1]] Si which is close to the center portion between the two boards Sa, Sb, the other component placing head 43b (43a) mounts the components on the other of the two boards Sb (Sa) at the interference-free zone except for the predetermined interference risk zone S1. This advantageously ensures that the chance for the two component placing heads 43a, 43b to interfere with each other can be minimized and therefore that the efficiency in mounting the components on both of the boards Sa, Sb can be enhanced.

Please replace the paragraph beginning at page 50, line 15, with the following rewritten paragraph:

In the embodiment exemplified in Figures 18 and 27 for example, of the two board transfer devices 10a, 10b, one of them 10a is set as regular type product transfer device for transferring the boards only for the regular type products (type-A), while the other transfer device 10b is set as brake-in product transfer device for transferring the boards for brake-in

products (type-B) which are different in the board width from the regular type products (type-A). The program for controlling the operation of the component mounting apparatus which has been so set is provided ~~being~~ to be designed to control the apparatus in such a way that in response to a production command for brake-in products of a certain type (type-B) other than the regular type products (type-A), the other board transfer device 10b is operated to unload the board for the regular type products (type-A) therefrom while preventing another board for the regular type products (type-A) from being loaded thereto, a mounting program for controlling the mounting operations at the other board transfer device 10b is changed to another mounting program corresponding to the brake-in products of the certain type (type-B), the other board transfer device 10b is adjusted to have a rail-to-rail width corresponding to the brake-in products of the certain type (type-B), and the boards for the brake-in products of the certain type (type-B) are successively loaded onto the other board transfer device 10b to have components mounted thereon. Thus, when the command for the production of the brake-in products (type-B) is given during the production of the regular type products (type-A), both the two board transfer devices 10a, 10b are not required to be rearranged or prepared immediately, and instead, only the board transfer device 10b set for the brake-in products (type-B) can be rearranged or prepared for the brake-in products (type-B) without being thrown into the state of disorder. This advantageously makes it possible to perform the rearrangement or preparation of the transfer device within a short time period and at low cost.

Please replace the paragraph beginning at page 51, line 14, with the following rewritten paragraph:

In the embodiment exemplified in Figures 18 and 19 for example, the program for controlling the operation of the component mounting apparatus is provided ~~being~~ to be designed to control the apparatus as follows. That is, where the regular type product in production is to be changed from the first regular type product (type-A) to the second type product (type-B), a trial basis production of the second type product (type-B) is performed at the other transfer device 10b which has been set for the brake-in products, while the component mountings are being continued at one of the transfer devices 10a. And, if the trial basis production does not give rise to any problem, the other board transfer device 10b is set for the regular type products, and the component mountings on the boards for the second type products (type-B) are then performed on a full-scale basis, in connection with which a setting alteration is executed to set the one board transfer device 10a as the brake-in product transfer device. According to the program, when the command for the production of the brake-in products (type-B) is given during the production of the regular type products (type-A), both the two board transfer devices 10a, 10b are not required to be rearranged or prepared immediately, and instead, only the board transfer device 10b set for the brake-in products (type-B) can be rearranged or prepared for the brake-in products (type-B) without being thrown into the state of disorder. In this way, any problem accompanied by the production of the second type products can be extracted prior to the full-scale basis production thereof without discontinuing the production operation by the component mounting apparatus. Therefore, the occurrence of poor quality after the starting of the full-scale basis production

can be obviated, so that the change of the products from a certain kind of products to another kind of products can be made smoothly.

Please replace the paragraph beginning at page 52, line 11, with the following rewritten paragraph:

In the embodiment exemplified in Figure 20 for example, the program for controlling the operation of the component mounting apparatus is provided ~~being~~ to be designed to control the apparatus as follows. Where the products on which the component mountings are being performed at both of the two board transfer devices 10a, 10b are to be changed from the first type product (type-A) to the second type product (type-B), a trial basis production of the second type product (type-B) is performed at the other transfer device 10b while the component mountings on the first type products (type-A) are being continued at one of the transfer devices 10a. And, if the trial basis production does not give rise to any problem, the component mountings on the boards for the second type products (type-B) are then performed on the full-scale basis. Thereafter, if any problem does not result from the trial basis component mounting operations on the second type products (type B) at the one board transfer device 10a, the component mountings on the full-scale basis are initiated at the one board transfer device 10a. Therefore, any problem accompanied by the production of the second type products (type-B) can be extracted prior to the full-scale basis production thereof without discontinuing the production operation by the component mounting apparatus. Consequently, the occurrence of poor quality after the starting of the full-scale basis production can be obviated, so that the change of the products from a certain kind of products

to another kind of products can be made smoothly.

Please replace the paragraph beginning at page 53, line 3, with the following rewritten paragraph:

In the embodiment exemplified in Figure 21 for example, the program for controlling the operation of the component mounting apparatus is provided ~~being~~ to be designed to control the apparatus as follows. That is, the two board transfer devices 10a, 10b for transferring the boards in respective directions parallel to each other guide to guide the both sides of each board with two guide rails thereof. All the guide rails 25a, 26a, 25b, 26b are adjustable to be altered by the guide rail position adjusting means 30 (Figure 2) in a direction perpendicular to the lengthwise or longitudinal direction thereof. In accordance with the program, the guide rail position adjusting means 30 is controlled in such a way that it positions the outside guide rails 25a, 25b at the side of the component supply devices 45a, 45b, to the positions closest to the component supply devices 45a, 45b and also positions the center side guide rails 26a, 26b in dependence upon the boards to be transferred therealong. Thus, when each two guide rails 25a, 26a (25b, 26b) is narrowed in width, the extra space is formed between the center side guide rails 26a, 26b. This extra space advantageously further separates the two boards transferred by the two board transfer devices 10a, 10b, so that the chance for the two component placing heads 43a, 43b to interfere with each other can be minimized more reliably.

Please replace the paragraph beginning at page 53, line 21, with the following rewritten paragraph:

In the embodiment exemplified in Figure 22 for example, the component mounting system employs a component mounting apparatus which comprises two board transfer devices 10a, 10b for respectively transferring boards Sa, Sb, a component supply device 45a (or 45b) for supplying components of plural kinds to be mounted on the boards Sa, Sb, and a component placing device 40 for picking up the components supplied from the component supply device 45a (or 45b) to mount the picked-up components on the boards Sa, Sb. The system is operable selectively in the first and second production modes. In the first production mode, the component placing device 40 mounts components on two boards Sa, Sb which have been transferred by the two board transfer devices 10a, 10b to respective component mounting positions. In the second production mode, on the contrary, one of the two board transfer devices 10a is used as mounting conveyor where the component placing device 40 mounts components on the boards Sa, while the other board transfer device 10b is used as bypass conveyor by which the boards Sb unnecessary to have components mounted thereon are transferred to bypass the component mounting operations at the one board transfer device 10a. With this configuration, when a certain component mounting apparatus falls in difficulties in a production line with plural component mounting apparatus connected in series, the other transfer device 10b can be utilized to make the boards bypass the troubled apparatus and to send the boards to another component mounting apparatus at the downstream for component mounting operations thereon. Therefore, it ~~dose no~~ does not occur that the production line falls in shutdown as a whole. Further, the boards which are

small in the number of the components to be mounted thereon can be made to bypass any component mounting apparatus which does not perform the component mounting operations on the boards, so that the productivity of the boards can be further enhanced.